Funding, Time, and Efficiency of Cardiovascular Scientists Funded by the NHLBI Over 30 Years

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Disclosures: None

Background

- Need for evidence-based funding analysis.
- Investigator-oriented approach.

Objective

- To identify significant predictors of high-impact for NHLBI-funded cardiovascular *scientists* as measured by top-10% citation count.
- To assess the award efficiency for portfolios with different funding levels.

Methods

- Cohort: 5768 scientists who received at least one NHLBI R01,R21, P01 or U01 grant funded between 1980 and 2011.
- Productivity metric and award: The number of top-10% papers per *scientist*, i.e., papers among the top 10% cited (Thomson-Reuters InCites database), for its field/year/type produced by each grant; awards are BRDPI inflation- adjusted to 2000 constant dollars.
- Total number of publications: 91,814 articles
- Number of top-10% papers: 20,471 (22%)
- Statistical analyses: Pareto plot; productivity response curve plot; clustering; random forest regression; bootstrap resampling.
- Portfolio metrics: Average award efficiency: total productivity/total award; Marginal award efficiency: net increase/decrease per additional $1M funding to the portfolio.

Results

Figure 1. Per-investigator funding allocation follows Pareto-like distribution (top); Increased annual award size shows the law of diminishing return in productivity (bottom).

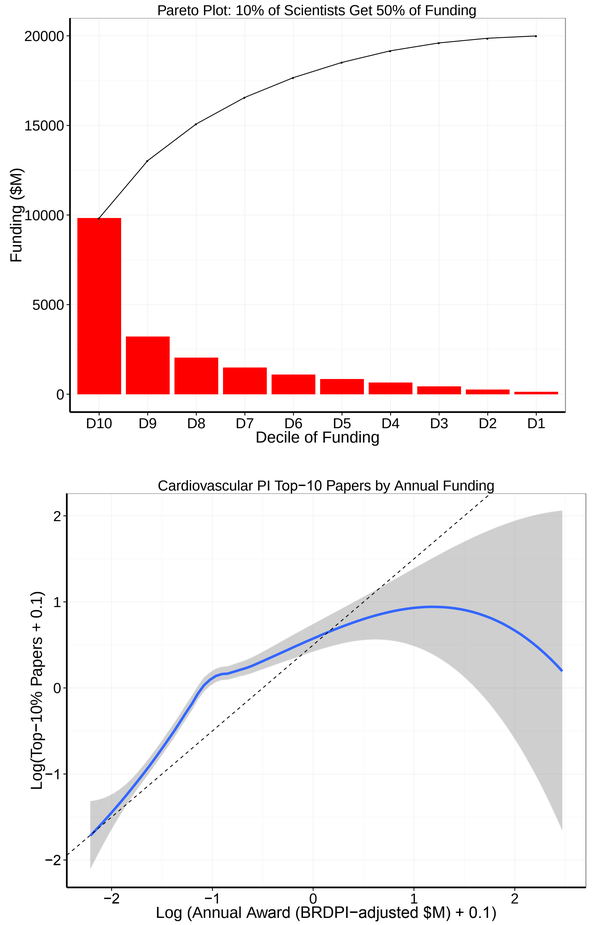


Figure 2. Comparison of average award efficiency for low, intermediate, and high funding portfolios (top); Estimated marginal award efficiency as measured by top-10% articles produced per additional $1M funding (bottom).

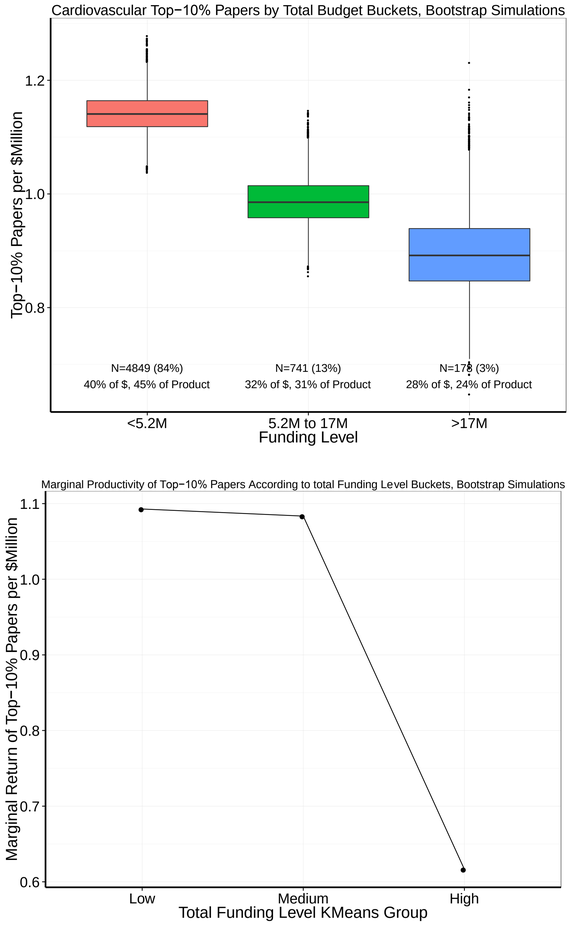
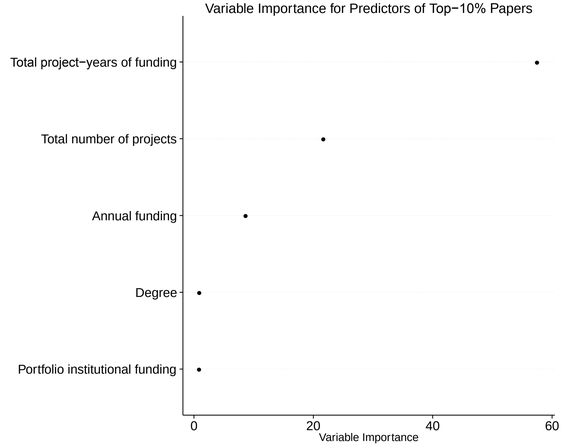


Figure 3. Total project-years is more important than annual funding as a predictor of productivity.



Summary of Findings

- The distribution of per-investigator funding is highly skewed, with 10% of the investigators receiving 50% of the funds.
- Productivity of top-10% papers is an increasing function of the annual award, reaching a peak about $370K and shows diminishing marginal returns afterward.
- In contrast, productivity steadily increased with increasing project-years of funding.
- Portfolio-wide efficiency decreases as the average funding size increases within portfolio.
- The most important predictor of productivity was project-years of funding, while annual funding was much less important.